comprises a means for controlling the temperature of each said separate independent radiant zone independently.

REMARKS

Reconsideration and allowance are respectfully requested.

In paragraph 1 of the Office Action the Examiner objected to Figure 2. In response, Applicants submit herewith a newly corrected drawing wherein both reference numerals "22" have been changed to "32" and both point to burners. Support for the amendment is found in the originally filed specification at, *inter alia*, page 7, lines 13-16; page 7, lines 24-28; page 8, lines 10-13; and page 8, lines 21-25. No new matter has been added. Accordingly, it is respectfully submitted that the Examiner's objection to Figure 2 is overcome.

Also submitted herewith is a new formal drawing for Figure 1. Applicants respectfully request that this new formal drawing be made of record herein. No new matter has been added.

As requested in paragraph 2 of the Office Action, Applicants have further reviewed the drawings for further errors but are not currently aware of any.

In paragraph 3 of the Office Action, the Examiner objected to the specification for various informalities. In response, Applicants have made the requested

changes. No new matter has been added. Accordingly, Applicants respectfully submit that the objections to the specification are overcome.

As requested in paragraph 4, Applicants have reviewed the specification but are not currently aware of any further minor errors. No new matter has been added.

In paragraphs 5 and 6 of the Office Action, the Examiner rejected Claim 8 under 35 U.S.C. 112, second paragraph, as being indefinite. In response, Applicants have amended Claim 8 in accordance with the Examiner's helpful suggestions. No new matter has been added. Accordingly, Applicants respectfully request withdrawal of the rejection.

In paragraphs 7and 8 of the Office Action, the Examiner rejected Claims 1, 3, 5 and 8-10 under 35 U.S.C. § 102(b) as being anticipated by the Thompson (2,323,498). Applicants respectfully traverse the rejection.

Applicants believe that the Examiner is misunderstanding the claimed invention. The claimed invention requires the furnace to comprise radiant chambers that further comprise separate independent radiant zones. The provision of radiant chambers that have separate independent radiant zones provides a furnace unexpectedly provides a furnace that has substantially improved flexibility in dealing with modern refinery problems. As indicated on page 2 of the originally filed specification, currently larger plants with increased capacity are being developed. As a requirement of these plants, however, a lesser number of reactors are required. As an additional problem, these furnaces are required to possess the ability to crack different feedstocks. Thus, there exists a need in the art for an invention in which a furnace can be provided that is larger, but have improved flexibility for

cracking more than one feedstock if necessary. Because each different feedstock and desired product slate requires the use of different reaction conditions, *i.e.*, reaction temperature and residence time, none of the currently available furnace technologies are suitable.

For example, the primary reference, Thompson '498, relied on by the Examiner is typical of a conventional type furnace. Applicants respectfully submit that contrary to the Examiner's assertions, Thompson '498 does not disclose each and every feature called for in the present claims. Specifically, Thompson '498 does not disclose a furnace having a fired radiant chamber separated into at least two separate independent radiant zones. Instead Thompson '498 discloses a furnace divided into two fired radiant chambers. Applicants submit that the furnace 2 of Thompson '498 is divided into two fired radiant chambers 7 and 7'. These chambers are not further subdivided, and Thompson '498 does not provide any suggestion to make a further subdivision of the chambers.

Applicant further submits that one cannot view the entire furnace as the chamber, which is then divided into two separate independent radiant zones. This still would not meet the claim requirements of three components, *i.e.*, the furnace, which is subdivided into radiant chambers, which are further subdivided into separate independent radiant zones. Accordingly, Applicants respectfully submit that Thompson '498 cannot be relied upon to anticipate the claims under 35 U.S.C. 102(b).

Furthermore, Applicants respectfully submit that contrary to the Examiner's assertions, Thompson '498 does not disclose a separate and independent temperature control for each radiant zone. The plates 17 are merely stated by Thompson '498 to regulate the amount of excess air to be admitted to the heater through the ports 16. First, as discussed

above, the plates are merely regulating the air into the radiant chambers, not the radiant zones of the radiant chambers. Moreover, there is no disclosure that these plates can operate independently from each other. Thus, Thompson '498 does not disclose each and every limitation of Claim 8 and therefore cannot anticipate Claim 8 under 35 U.S.C. 102(b).

In paragraphs 9-12 of the Office Action, the Examiner rejected Claims 2 and 4 under 35 U.S.C. 103(a) as being unpatentable over Thompson. Applicants respectfully traverse this rejection.

For the reasons set forth above, Applicants respectfully submit that the Thompson '498 reference does not render the claimed invention obvious. Moreover, there is absolutely no disclosure in Thompson '498 that would provide the motivation to one skilled in the art to subdivide the radiant chambers into separate and independent radiant zones, let alone have two or more radiant chambers that are subdivided into at least two independent radiant zones. In this manner, unexpectedly, Applicants have found that a single furnace can operate in modern petrochemical plants to handle more than one feedstock and/or to crack at different conditions to provide different product slates. There is absolutely no suggestion in Thompson '498 to operate at different cracking conditions or to employ different feedstocks in different process tubes that proceed through different separate and independent radiant zones.

Applicants have not merely duplicated the essential working parts of a device as contended by the Examiner. Instead, Applicants have developed a novel and unobvious approach to solving a need in the art, namely, how to provide a single furnace with the capability to provide flexibility to the plant operator of cracking different

feedstocks at different cracking conditions to provide a different product slate. Surprisingly, the furnace as claimed in the present invention solves this long felt problem in the art.

Accordingly, Applicants respectfully submit that Thompson '498 does not, and cannot be construed to, teach or suggest the present claimed invention.

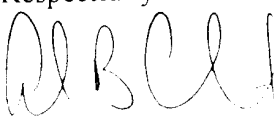
In paragraph 13 of the Office Action, the Examiner rejected Claims 6-7 and 11-12 under 35 U.S.C. 103(a) as being unpatentable over Thompson (2,323,498) in view of Kushch et al (6,159,001 or 5,711,661). Applicants respectfully traverse the rejection.

For the reasons set forth above, Applicants respectfully submit that this rejection is in error. Neither of the Kushch et al. references teach or suggest the shortcomings of the Thompson '498 reference.

Accordingly, Applicants respectfully submit that this rejection is overcome.

The Examiner is invited to contact the undersigned to resolve any still outstanding matter. Early and favorable action is earnestly solicited.

Respectfully submitted,



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37 C.F.R. 1.121(b)(1)(iii) ATTACHMENT

(1) First full paragraph on page 4:

The dividing wall can be made only of a material [which] that can withstand the temperatures in the radiant zone of the reactor, which can exceed temperatures of 2200°F. Accordingly, the dividing wall may be comprised of conventional fire brick. The dividing wall may also be comprised of a cloth-type material known as NEXTEL brand ceramic fiber textile, or may be a curtain made of this material. In this type of embodiment, the curtain is hung from rod supports. Other materials [which] that provide similar thermal properties may also be used.

(2) Second full paragraph on page 4:

NEXTEL is a tradename of the 3M Company for a family of ceramic fiber textile products. NEXTEL [fibres] ceramic fiber textile products are made from a synthetic precursor, not molten refractory oxides as are typically the case with ceramics. The synthetic [fiber is] fibers are formed in a continuous length to a controlled diameter and are then pyrolyzed to convert the synthetic materials into a ceramic. The continuous [filiament] filament ceramic fibers are spun into yarns and roving [which] that can then be used to weave, braid, knit or twist a variety of textile product forms, including a fabric for the curtains of the [illegible] NEXTEL 312 brand ceramic fiber

textile product that [which] is composed of alumina/silica/boria. Also contemplated for use herein is NEXTEL 440 brand ceramic fiber textile product.

(3) Paragraph bridging pages 5 and 6:

The furnace 2 of Figure 1 is also provided with four process coils. The first process coil 40 is preheated in exchanger 42 in the convection chamber 4 and then proceeds through into the first separate independent radiant zone 12. The second process coil 44 is preheated in exchanger 46 in the convection chamber 4 and then proceeds through the second independent radiant zone 14. The third process coil 48 is preheated in exchanger 50 and then proceeds through the third independent radiant zone 18. The fourth process coil 52 is preheated in exchanger [52] 54 and then proceeds through the fourth independent radiant zone 20. In Figure 2, for example, each of the four radiant zones [10] 12, 14, 18 and 20 is provided with two process coils, 40A, 40B, 44A, 44B, 48A, 48B, 52A and 52B, respectively.

37 C.F.R. 1.121(c)(1)(ii) ATTACHMENT

2. (Amended) A furnace [as defined in Claim 1 comprising] for cracking hydrocarbon feed to produce olefins, said furnace comprising

(a) at least two fired radiant chambers [and wherein,] wherein each said fired radiant chamber [comprises] is divided into at least two separate independent radiant zones by a fired radiant chamber dividing means;

(b) at least one radiant burner in each said zone of said fired radiant chamber;

(c) a convection chamber in direct communication with each said fired radiant chamber;

(d) at least one process coil for each said separate independent radiant zone, wherein each said process coil extends through at least a portion of said convection chamber and extends into one of said separate and independent radiant zones before exiting said furnace;

(e) a flue for discharging flue gas located at the top of each said convection chamber of said furnace; and

(f) a means for independently controlling the radiant burners in each said separate independent radiant zone.

8. (Amended) A furnace as defined in Claim 1 wherein said means for independently controlling the radiant burners in each said separate independent radiant zone comprises a means for controlling the temperature of each said separate independent radiant zone [is controlled] independently.